AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the Application.

Listing of Claims:

1. **(Currently Amended)** An electromagnetic wave vibrometer apparatus comprising:

a signal generator for generating an electromagnetic signal;

an amplitude modulator for amplitude modulating the electromagnetic signal to produce an amplitude modulated signal;

a first transmitter for transmitting the amplitude modulated signal at a vibrating object;

a first receiver for receiving a reflected amplitude modulated signal from the vibrating object;

a second vibration receiver mounted with the first receiver for compensation of unwanted background or coupled vibration;

a demodulator for demodulating the reflected amplitude modulated signal to produce a demodulated signal; and

a signal processor for extracting and analyzing a vibration waveform from the demodulated signal.

2. **(Previously Presented)** The apparatus of claim 1 wherein the electromagnetic signal is an optical signal.

3. **(Original)** The apparatus of claim 2 wherein the optical signal is amplitude modulated with a microwave frequency signal.

4. **(Previously Presented)** The apparatus of claim 1 wherein the electromagnetic signal is a microwave signal.

5. **(Previously Presented)** The apparatus of claim 1 wherein the electromagnetic signal is a combination of optical and microwave signals.

6. **(Previously Presented)** The apparatus of claim 5 wherein the optical and microwave signals are modulated at the same frequency.

7. **(Original)** The apparatus of claim 1 further comprising a laser signal source.

8. **(Original)** The apparatus of claim 1 further comprising an LED signal source.

9. **(Cancelled)**

10. **(Currently Amended)** The apparatus of claim ~~9~~ 1 further comprising a second vibration transmitter mounted with the first receiver for calibration of the apparatus and to determine an angle of reflection.

11. **(Currently Amended)** An apparatus for remotely measuring properties of an object comprising:

a signal generator for generating an electromagnetic signal;

an amplitude modulator for amplitude modulating the electromagnetic signal with a modulating signal to produce an amplitude modulated signal;

a transmitter for transmitting the amplitude modulated signal at an object;

means for vibrating the object to modulate the amplitude modulated signal transmitted at the object;

a first receiver for receiving a reflected amplitude modulated signal from the object;

a second vibration receiver mounted with the first receiver for compensation for unwanted background or coupled vibration;

a demodulator for demodulating the reflected amplitude modulated signal using the modulating signal to produce a demodulated signal; and

a signal processor for extracting and analyzing a vibration waveform from the demodulated signal.

12. **(Previously Presented)** The apparatus of claim 11 wherein the electromagnetic signal is an optical signal.

13. **(Original)** The apparatus of claim 12 wherein the optical signal is amplitude modulated with a microwave frequency signal.

14. **(Previously Presented)** The apparatus of claim 11 wherein the electromagnetic signal is a microwave signal.

15. **(Previously Presented)** The apparatus of claim 11 wherein the electromagnetic signal is a combination of optical and microwave signals.

16. **(Previously Presented)** The apparatus of claim 15 wherein the optical and microwave signals are modulated at the same frequency.

17. **(Original)** The apparatus of claim 11 further comprising a laser signal source.

18. **(Original)** The apparatus of claim 11 further comprising an LED signal source.

19. **(Cancelled)**

20. **(Currently Amended)** The apparatus of claim ~~19~~ 11 further comprising a second vibration transmitter mounted with the first receiver for calibration of the apparatus and to determine an angle of reflection.

21. **(Currently Amended)** A method of remotely measuring vibration comprising:

generating an electromagnetic signal;

amplitude modulating the electromagnetic signal with an amplitude modulating signal to produce an amplitude modulated signal;

transmitting the amplitude modulated signal at a vibrating ~~object;~~ object using a first transmitter;

receiving a reflected amplitude modulated signal from the vibrating ~~object;~~ object using a first receiver;

demodulating the reflected amplitude modulated signal using the amplitude modulating signal to produce a demodulated signal; ~~and~~

compensating for vibration errors by determining displacements of the transmitter and receiver; and

analyzing the demodulated signal.

22. **(Previously Presented)** The method of claim 21 wherein the electromagnetic signal is an optical signal.

23. **(Cancelled)**

24. **(Previously Presented)** The method of claim 21 wherein the electromagnetic signal comprises a microwave signal.

25. **(Previously Presented)** The method of claim 21 wherein the electromagnetic signal comprises a combination of microwave and optical signals.

26. **(Previously Presented)** The method of claim 25 wherein the optical and microwave signals are modulated at the same frequency.

27. **(Previously Presented)** The method of claim 21 wherein the electromagnetic signal is generated by a laser or a laser diode.

28. **(Previously Presented)** The method of claim 21 wherein the electromagnetic signal is generated by an LED.

29. **(Cancelled)**

30. **(Currently Amended)** The method of claim ~~29~~ 21 further comprising providing a second vibration receiver mounted with the first receiver for compensating for unwanted background or coupled vibration.

31. **(Previously Presented)** The method of claim 30 further comprising providing a second vibration transmitter mounted with the first receiver for calibrating the vibrometer and to determine an angle of reflection.

32. **(Previously Presented)** A method for remotely determining properties of an object comprising:

amplitude modulating an electromagnetic signal with an amplitude modulating signal to produce an amplitude modulated signal;

transmitting the amplitude modulated signal at an object;

vibrating the object;

receiving reflected amplitude modulated signals from the vibrating object using a first receiver;

compensating for unwanted vibration using a second receiver mounted with the first receiver; and

processing the reflected amplitude modulated signals to extract information about the properties of the object.

33. **(Previously Presented)** The method of claim 32 wherein the electromagnetic signal is an optical signal.

34. **(Cancelled)**

35. **(Previously Presented)** The method of claim 32 wherein the electromagnetic signal comprises a microwave signal.

36. **(Previously Presented)** The method of claim 32 wherein the electromagnetic signal comprises a combination of microwave and optical signals.

37. **(Previously Presented)** The apparatus of claim 32 wherein the optical and microwave signals are modulated at the same frequency.

38. **(Previously Presented)** The method of claim 32 wherein the electromagnetic signal is generated by a laser or a laser diode.

39. **(Previously Presented)** The method of claim 32 wherein the electromagnetic signal is generated by an LED.

40. **(Previously Presented)** The method of claim 32 wherein the electromagnetic signal is split into first and second signals and the second signal is transmitted to a demodulator for comparing the second signal with the reflected amplitude modulated signals.

41. **(Cancelled)**

42. **(Cancelled)**

43. **(Previously Presented)** The method of claim 32 further comprising providing a second vibration transmitter mounted with the first receiver for calibrating the vibrometer and to determine an angle of reflection.

44. **(Previously Presented)** The method of claim 1, wherein the amplitude modulated signal is modulated in the GHz range.

45. **(Previously Presented)** The method of claim 11, wherein the amplitude modulated signal is modulated in the GHz range.

46. **(Previously Presented)** The method of claim 21, wherein the amplitude modulated signal is modulated in the GHz range.

47. **(Previously Presented)** The method of claim 32, wherein the amplitude modulated signal is modulated in the GHz range.

48. **(Currently Amended)** A method of remotely measuring vibration, comprising:

providing a non-coherent beam of light;

amplitude modulating the non-coherent beam of light with an amplitude modulating signal to produce an amplitude modulated beam of light;

transmitting the amplitude modulated beam of light at a vibrating ~~object;~~ object using a transmitter;

receiving a reflected amplitude modulated beam of light from the vibrating object using a receiver;

compensating for vibration errors by determining displacements of the transmitter and the receiver; and

demodulating the reflected amplitude modulated beam of light using the amplitude modulating signal to extract vibration information from the amplitude modulated signal.

49. **(Previously Presented)** The method of claim 48, wherein the non-coherent beam of light is produced by an LED.

50. **(Previously Presented)** The method of claim 48, wherein the non-coherent beam of light is an optical signal.

51. **(Cancelled)**

52. **(Currently Amended)** The method of claim ~~51~~ 48, further comprising compensating for unwanted background or coupled vibration using a second receiver.

53. **(Previously Presented)** The method of claim 52, further comprising determining an angle of reflection using a second vibration transmitter mounted with the receiver.

54. **(Previously Presented)** A microwave vibrometer, comprising:

a signal generator for generating a first microwave frequency signal;

a power splitter for splitting the first microwave signal into a reference signal and a signal to be transmitted;

a circulator for transmitting the signal to be transmitted at a vibrating object, for receiving a phase modulated reflected signal from the vibrating object, and for decoupling the transmitted signal from the reflected signal;

a first mixer for mixing the phase modulated reflected signal with an intermediate frequency signal to produce a first mixed signal;

a second mixer for mixing the reference signal with the intermediate frequency signal to produce a second mixed signal;

an I & Q demodulator for mixing the first mixed signal and the second mixed signal to produce a demodulated signal; and

means for extracting and analyzing a vibration waveform from the demodulated signal.